White Paper Report

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Visualizing Flow & Movement in the Humanities

In October 2012, the University of Redlands hosted an interdisciplinary specialist's workshop on *Visualizing Flow and Movement in the Humanities*, an emerging research area at the intersection of digital humanities, geography, and information technology. Whether we are interested in the flow of democratic ideas, the migration of early Christian monks to Africa, or the peregrinations of Native American ancestral sites, we are seeking to characterize the movement of entities through space and time. Even with the popularity of map-making and the fact that location-aware technologies pervade our lives, there are few satisfying ways to visualize flow and movement of entities (people, ideas, etc.) across geographic space. Current GIS tools and web programming allow researchers to create simple maps with lines connecting points, but their visual output is uninspiring and their usability is limited. At the Redlands' event, participants identified intellectual and pedagogical questions about the nature and visualization of flow and movement, critiqued currently available tools, and discussed the barriers and user requirements for creating new digital solutions.

As one of our grant's planned outcomes, we had anticipated envisioning and specifying a single, integrated and innovative technology solution, i.e., a new tool that would meet many of the flow-mapping needs. However, throughout the workshop when we described situations or contexts that contained flow or movement, or a flow image or map itself, we found our verbal descriptions to be inadequate for communication across our diverse group. We wondered how likely it would be to be able to design a tool to represent many instances of flow and movement when we were still struggling with verbally categorizing, interpreting, and describing a broad set of examples. We realized that the number of variables at play in each situation contributed exponentially to the parameters that would need to be controllable. Developers are already using a mix of tools and technologies to design and create flow representations, and there was no obvious place in the workflow where a new tool for dynamic representations could fit, systematically and conveniently.

After discussing this at length, we collectively came to the conclusion that what we need first is a visual collection of exemplars that would illustrate a representative mix of flow and movement maps. These would be categorized to help users appreciate the distinctive different types of flow and movement maps, and each example would include detailed annotations on the types of data that are behind such maps, and the suite of software applications currently necessary to produce them. For the organizational architecture behind this, we envisioned an online database that would allow us to collect examples from scholars and "tag" the example within the collection to promote effective search and discovery. With the extension to our grant period that we were granted by NEH, we began to organize flow maps into categories, annotated a handful of examples, and built a simple prototype webpage to illustrate these ideas.

Project Activities and Key Areas of Discussion

We spent the time of our grant period on three work tasks: (1) gathering information and prepare for the workshop; (2) delivering a workshop; and (3) envisioning and building a simple prototype series of web pages that illustrate our flow mapping exemplar ideas.

The workshop itself consisted of presentations, demonstrations, whole-group discussions, and smaller, break-out discussion sections. By the final day of the workshop, it became clear that the most pressing item to develop next was not a new flow mapping tool, but rather a web-based, visual collection of flow and movement mapping examples. Fortunately, we were able to use the last phase of our grant period to build a simple prototype of this that is ready for future expansion and development.

The most significant change to our proposed work was a new idea that emerged during the last few hours of the workshop itself. Originally, we envisioned that the scholars at the workshop could design the specifications for what a new digital tool could do, one that was optimized for producing representations of flow and movement. During the workshop, while we were discussing the details of what would be necessary for this, it became clear that this would not be the most helpful product for the user community. Even among a group as small as ours, it was clear that the needs of the user community were both too diverse and specialized to permit a realistic needs-assessment to be complete. We were challenged to imagine how, when, and where workflows would be modified to accommodate such a tool. Moreover, our multi-disciplinary community struggled to use a common vocabulary for describing exactly what it wanted. We were surprised to experience nuanced language tensions even as we defined the terms “flow” and “movement.”

Most importantly, it became quite evident that text-based or verbal descriptions were inadequate for communication among the different groups involved. The geographers, GIScientists, humanists, designers, and computer scientists each brought their own prior knowledge and experiences to the table. We lacked a common vocabulary, and it was clear that we lacked shared expectations. *If that was a problem among our small and collegial group, it would be an even greater problem among the scholarly and professional community*. Rather than leaping to tool development, the participants collectively recommended that instead we focus on developing a collection of representative exemplars to aid in articulating wishes, expectations, and possibilities.

These discoveries by the group – the need to slow down and create a common vocabulary, and the recognition that more visual and explicit examples would be essential for improving understanding of the underlying issues behind flow and movement representation – was still a step forward for our workshop participants. In a way, our multi-disciplinary conversations helped us to reach an epiphany about why this research area has been struggling, and to accomplish the important work of reframing our problem and asking a new set of questions.

Because the scheduling of the workshop had to be changed due to extenuating circumstances, the final event was shorter and more condensed than originally planned. The same number of

people were able to participate, but some of the original guests were unavailable at the later date, and three people were unable to attend at the last minute.

The late October 2012 date for the workshop allowed us to coordinate with a separate-but-related event at the University of Redlands: a 1-day *Mapping People Symposium* that took place on October 31, 2012. The Symposium was funded wholly by a separate grant to the University of Redlands from the W. M. Keck Foundation. Approximately 80 people attended this event, which was open to the public. Dr. Ian Gregory, an internationally known specialist in Historical GIS and digital humanities, was the keynote speaker. Other invited speakers represented six different institutions and organizations, from throughout California. We were able to reference the just-completed NEH-sponsored workshop during the Symposium presentations. The synergy this co-ordination of events created benefitted our workshop participants.

An unexpected benefit of this delay was the workshop participation of Esri's Aileen Buckley. Dr. Buckley is one of the lead cartographers at Esri. Dr. Buckley is always interested in new cartographic questions and challenges, and has recently been making presentations and giving short workshops on methods of flow mapping. With the later workshop date, we were able to involve her with the event and reference her recently published materials. She began to experiment with recreating certain types of flow maps using Esri software, and this process shed light on some of the technical issues and questions we had been discussion. Because of Esri's international network, Aileen's related blog postings and workshops (see here and here) reach a wide audience.

Moreover, we were able to build from Dr. Buckley's approach for flow categorization as we began our own taxonomic exercise with our prototype website. After email-based discussion amongst the group, we settled on four representational categories: point-to-point, networks, branching and fields. Each of these represents cartographical products, but also builds on foundational understanding of how data can be structured and organized. These are the topics we would pursue further with a continuation of this project as well.

If a specific tool remains to be built, a technology that supports generating more nuanced and innovative representations of flow and movement, then having this visual library of exemplars in place will aid in every step of specification and design. It is possible that seeking other funds to pursue tool development would be appropriate at that stage of things.

Some of the key areas of discussion included:

1) Goals of visualization processes
    Focus on what matters
    Need to distinguish between the process of mapping vs. a map

2) Start with "What questions do you have?" Questions & data lead to tools and methods, not the other way around.

3) Some Humanities desired outcomes: Exploring connections vs. Discovering Patterns. Need to contextualize, organize, destabilize, create space for collaboration.

4) Borrowing Tools vs. Making Our own
- Pros and Cons
- Hybrid - use and adapt
- How is flow different in the humanities?

5) Flow vs. movement vs. change vs. migration

6) Objects vs. fields as data structures

7) Time is not only chronological. How can we indicate diffusion of ideas, individual journeys, fractured and/or disjointed narratives. Space needs to be malleable and not always part of conventional geography. Tools for representations need to let us be flexible with time and space?

8) Can we build a folksonomy around these ideas? Directed crowdsourcing, to improve and enhance the tagging of a collection?

9) Can time become stationary and we are the ones that move through time?

10) Needed: examples of how data need to be organized, and can be organized. What does it look like to have data organized in a way that would enable this specific kind of map / representation. Need to be able to **reverse engineer** a representation.

12) If we put our minds to it, we can come up with exemplars that represent 80% of our needs. Not spend too much time and resources on the other 20%, they'll emerge on their own if we can open this up to contributions from the broader scholarly community.

13) Components or elements that need tagging include: the visual outcome; workflows; interoperability; software and other applications used; data sources; data formatting; sequence of necessary steps. Basically, can you share examples of flow representation

and explain - through reverse engineering - what would have been necessary to create a representation like that.

Evaluation

Our experience in designing previous workshops supported our premise that a highly interdisciplinary workshop could be effective in helping to bridge knowledge gaps and stimulate new insights for digital humanities scholars. With this in mind, we invited a group of people with very different disciplinary backgrounds. What we did not realize was that this research area of flow and movement was so nascent, and yet also so much in demand by multiple disciplines. We guided discussion as needed by recognizing the gaps in our respective disciplines, emphasizing our common goal of making progress in understanding this difficult topic, listening very carefully, and describing things in different ways than we had initially thought necessary.

Our assessment of the program suggests that it was necessary to go through some professionally awkward conversations in order to get past those points. It was a real achievement to reach a group consensus about the need for a different final product: not a tool, but a database and digital collection of exemplars that can illustrate principles, truths, methods, approaches, tools, etc. Our inability to achieve our originally proposed goals was not a problem of scale or timing, if you will – we were too far ahead of the community of research and practice in our thinking. We needed to slow down and recognize that there was not enough common ground and evidence and scholarship yet to support more advanced conversations about tool building and technology. And in fact, the technology itself is still fairly rudimentary for handling things like flow and movement, which complicates the issue.

Continuation of the Project

Visualizing flow and movement remains a compelling need in the humanities and GIScience communities. This continues to be strongly evident at the University of Redlands, where a significant number of faculty are involved with projects that will benefit from this advances and new ideas in this area. Therefore the University of Redlands is committed to make further progress towards development of this project. This will involve coordinating new efforts between the former PI, Diana Sinton, and the new Director of Spatial Studies, Steven Moore. Together, they will identify and prioritize the next set of steps required, and seek funding when appropriate.

Long Term Impact

The NEH workshop was part of a long-term strategy to develop institutional excellence in infusing spatial thinking and digital technologies across the liberal arts curriculum at the University of Redlands. This workshop leveraged a decade of prior investment by the University including externally-sponsored research and academic development grants such as the grant from the W. M. Keck Foundation. The idea for the NEH workshop evolved based on demand from a growing number of Redlands faculty, primarily in the humanities, who are intentionally experimenting with and integrating digital and geospatial technologies into their teaching and research.

The collective outcome of this spatial learning initiative, of which the NEH workshop formed a part, has been significant. The University has continued to invest in spatial thinking and analysis in various ways, through faculty positions and the approval of new initiatives. These include the creation of an undergraduate minor in spatial studies, two new centers applying spatial analysis to business and management in the School of Business, the design of a new spatial learning certificate program in the School of Education, and high-level, cross-campus strategic planning for future education and research programs. While we are still in an early-growth phase, this institutional investment has enabled our faculty to expand their reach in a variety of ways within and beyond their classrooms, including the pursuit of other funding from external and internal sponsors for related spatial and digital humanities research projects.

Grant Products

The primary product from the grant is the prototype of a visual collection of exemplars flow and movement representations, available at http://lens.spatial.redlands.edu/?page_id=748. The initial work has been done to envision categories and annotations. It is this type of information that we may expand into a more extensive portal, built around simple database to house the information about each image and enable users to contribute additional ones as they continue to be identified.